CLAIMS

1. A plasma processing apparatus, which performs a plasma process for the reverse face of a wafer for which an insulating sheet is adhered to the obverse face and which, for the plasma process, handles at least two wafers, a large wafer and a small wafer, comprising:

an integrally formed electrode member, which is located in a process chamber that defines a closed space and which has a mounting face larger than a large wafer so that a wafer can be mounted while the insulating sheet is contacting the mounting face;

a pressure reduction unit, for discharging a gas from the closed space to reduce pressure;

a gas supply unit, for supplying a plasma generation gas to the closed space in which the pressure has been reduced;

an opposing electrode, positioned opposite the electrode member;

a plasma generator, for applying a high frequency voltage between the electrode member and the opposing electrode to set the plasma generation gas into a plasma state;

a DC voltage application unit, for applying a DC voltage to the electrode member to electrostatically attract the wafer positioned on the mounting face;

a cooling unit for cooling the electrode member; and

a cover member, which has a ring shape and which is detachably covering outer portion of the mounting face, an inner diameter

of the cover member being substantially equal to an outer diameter of the wafer placed on the mounting face,

wherein the mounting face of the electrode member is divided into

a first area, which is located in the center of the mounting face, wherein a metal, the material used for the electrode member, is exposed,

a first insulating area, the surface of which is covered with an insulating film, that encloses, like a ring, the outer edge of the first area,

a second area, wherein the metal is exposed, that is extended, like a ring, around the outer edge of the first insulating area, and

a second insulating area, the surface of which is covered with an insulating film, that encloses, like a ring, the outer edge of the second area,

wherein a boundary between the first area and the first insulating area is designated inside the outer edge of a small wafer positioned in the center of the mounting face, and a boundary between the first insulating area and the second area is designated outside the outer edge of the small wafer, and

wherein a boundary between the second area and the second insulating area is designated inside the outer edge of a large wafer positioned in the center of the mounting face, and the second insulating area extends outward from the large wafer.

2. A plasma processing apparatus according to claim

1, wherein said cover member completely covers the second area.

3. A plasma processing apparatus according to claim 2, wherein the cover member is attached to the mounting face when a small wafer is to be processed, or is removed from the mounting face when a large wafer is to be processed.

4. A plasma processing apparatus according to claim 2, wherein the cover member is made of ceramic.

5. A plasma processing apparatus according to claim 2, wherein the cover member is formed of a thick outer ring and a thin internal ring that engages the thick outer ring.

6. A plasma processing apparatus according to claim 1, wherein the insulating film covering the first insulating area and the insulating film covering the second insulating area are made of aluminous ceramic.

7. A plasma processing apparatus according to claim 3, further comprising:

a plurality of suction holes formed in the first area and the second area;

a vacuum suction unit for creating a vacuum and producing suction that, through the suction holes, draws the wafer to and holds the wafer on the mounting face; and

a blocking member, having a ring shape, that is attached

to the second area, when the cover member is mounted on the mounting face, to block the plurality of suction holes in the second area,

wherein the cover member completely covers the blocking member.

8. A plasma processing apparatus according to claim 6, wherein the blocking member is formed by adhering, to one face of a ring-shaped plate made of the same material as the wafer, an insulating sheet made of the same material as the insulating sheet that is adhered to the wafer.

9. A plasma processing apparatus according to the present invention, which performs a plasma process for the reverse face of a wafer for which an insulating sheet is adhered to the obverse face and which, for the plasma process, can handle at least two wafers, a large wafer and a small wafer, comprising:

an integrally formed electrode member, which is located in a process chamber that defines a closed space and which has a mounting face larger than a large wafer so that a wafer can be mounted while the insulating sheet is contacting the mounting face;

a pressure reduction unit, for discharging a gas from the closed space to reduce pressure;

a gas supply unit, for supplying a plasma generation gas to the closed space in which the pressure has been reduced;

an opposing electrode, positioned opposite the electrode

member;

a plasma generator, for applying a high frequency voltage between the electrode member and the opposing electrode to set the plasma generation gas into a plasma state;

a DC voltage application unit, for applying a DC voltage to the electrode member to electrostatically attract the wafer positioned on the mounting face; and

a cooling unit for cooling the electrode member,

wherein the mounting face of the electrode member is divided into

a first area, which is located in the center of the mounting face, wherein a metal, the material used for the electrode member, is exposed,

a first insulating area, the surface of which is covered with an insulating film, that encloses, like a ring, the outer edge of the first area,

a second area, wherein the metal is exposed, that is extended, like a ring, around the outer edge of the first insulating area, and

a second insulating area, the surface of which is covered with an insulating film, that encloses, like a ring, the outer edge of the second area,

wherein a boundary between the first area and the first insulating area is designated inside the outer edge of a small wafer positioned in the center of the mounting face, and a boundary between the first insulating area and the second area is designated outside the outer edge of the small wafer,

wherein a boundary between the second area and the second insulating area is designated inside the outer edge of a large wafer positioned in the center of the mounting face, and the second insulating area extends outward from the large wafer, and the second insulating area is located outside the outer edge of the large wafer,

wherein a plurality of suction holes are formed in the first and the second areas and a vacuum suction unit is provided to create a vacuum and produce suction that, through the suction holes, draws the wafer to and holds the wafer on the mounting face, and

wherein a cover member, which has a ring shape and which is detachable from the mounting face, is closely adhered across the entire face of the second area to completely cover all the suction holes formed in the second area.

10. A plasma processing apparatus according to claim 9, wherein the cover member is attached to the mounting face when a small wafer is to be processed, or is removed from the mounting face when a large wafer is to be processed.

11. A plasma processing apparatus according to claim 9, wherein the cover member has a main body made of ceramic, and a resin layer is deposited at a location, on the lower face of the main body, that contacts the second area.

12. A plasma processing apparatus according to claim

8, wherein the cover member has an outer ring and an internal ring that engages the outer ring, and a resin layer is deposited at a location, on the lower face of the inner ring, that contacts the second area.

13. A plasma processing apparatus according to claim 9, wherein the insulating film covering the first insulating area and the insulating film covering the second insulating area are made of aluminous ceramic.